

$$\omega = \frac{d\theta}{dt} \quad \text{Ang velocity}$$

$$\alpha = \frac{d\omega}{dt} \quad \text{ang. acce.}$$

$$\int d\theta = \int \omega d\omega$$

$$v = \omega r \quad \text{velocity} \quad ds = r d\theta$$

$$v = \omega r \sin \phi$$

Acceleration

$$a_t = \frac{dv}{dt} \rightarrow \text{tang}$$

$$a_n = \frac{v^2}{r} \quad \text{normal}$$

$$\rightarrow \boxed{a_t = \alpha r}$$

$$a_t = \alpha r \sin \phi$$

$$\rightarrow \boxed{a_n = \omega^2 r}$$

$$a_n = \omega^2 r \sin \phi$$

Group

$$a = a_t + a_n$$

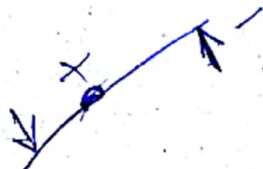
$$= \alpha r - \omega^2 r$$

$$dr_B = dr_A + dr_{B/A} \rightarrow \text{due to rot. about A}$$

due to trans. & rotation about A

$$v_B = v_A + v_{B/A}$$

$$v_B = v_A + \omega \times r_{B/A}$$



$$\rho = \frac{m}{V} \quad dm = \rho dV$$

$$a_B = a_A + (a_{B/A})_t + (a_{B/A})_n$$

mm mixed of member

$$I = \int_m r^2 dm$$

$$I = \int_m r^2 \rho dV$$



$$I = mk^2 \quad \text{or} \quad k = \sqrt{\frac{I}{m}}$$

Planar equations

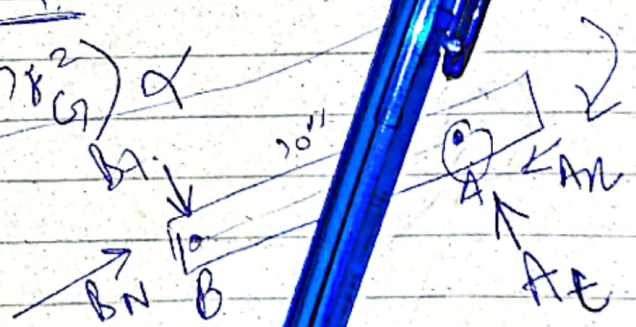
$$\sum F = m a_G$$

$$\sum F_x = m(a_G)_x$$

$$\sum F_y = m(a_G)_y$$

$$\sum M_G = I_G \alpha$$

$$\sum M_O = (I_G + m r_{GO}^2) \alpha$$



$$\sum M_A = 0$$

$$30(12) = 500(12)$$

$$B_x = 200 \text{ lb}$$

$$\sum F_x = 0$$

$$B_x - A_x = 0$$

$$200 = A_x$$

$M = 0$
 $\sum M = 0$